§MN511.03 Operating procedures.

(a) All surveys, plan layouts and designs are expected to be of such quality that they do not need to be redone. Small changes in layout and quantities are expected in the review stage, but major changes should not be needed.

(1) Final designs are to be completed by the area or project staff. Specialist from the state office will provide assistance and consultation on design.

(2) Design and review assistance are to be scheduled through appropriate channels so that pertinent technical personnel can provide timely assistance.

§MN511.04 Design analysis.

(c) The following is a list of software with the date of the latest version (and/or users manual), that has been distributed by the Minnesota State Office for official use. The IRM staff will only assist in installing engineering software that is approved by this list. Other programs may be used as documentation only if approved by the State Conservation Engineer on a case-by-case basis. The book containing all the users manuals is to be maintained in each area office and not on an individual basis. If individuals need a copy of any portion of the book, they are to make the needed photocopies for themselves. Many programs and users manuals can be downloaded off the NRCS Water and Climate Center (WCC) homepage at *www.wcc.nrcs.usda.gov*.

I. Software for NRCS official use and a brief description of their use:

- **AREAVOL** (see MN Bulletin 210-0-11 Feb 14, 1990) (3/24/89).
- **DRAIN.** Developed in North Dakota, this program calculates lateral effect using the Hooghoudt, Van Schilfgaarde and Skaggs methods.
- **Eagle Point AutoCad Map 2001, Intellicad and Autocad Lite.** These CADD programs are used to transfer survey information from an electronic data collector to the computer system. These programs draw cross-sections, profiles, and plan views, calculate quantities, prepare standard drawings, and numerous other capabilities.
- **Engineering Field Handbook, Chapter 2** (March 1989 program; Aug 1989 document). This version includes a personal computer program to speed calculations. Several similarities to Chapter 4 of TR55 are evident.
- **HECRAS (Version 3.0).** This program was developed by the Corps of Engineers to evaluate the water surface profile in a channel and much more. It replaces WSP2 for NRCS in-house use.
- **HYDRO-YARDAGE**, also known as the Iowa Pond Program (4/17/1996, Version 4.2, Manual dated 6/29/89 and labeled Version 3.0). This was developed by Jack Langford in August 1988 and is intended for the design of 378-Pond Structures. The results are similar to those of SITES. In addition, the program offers options for earthwork computations, cost evaluations and plots of profiles and cross-sections.
- **MPCA Feedlot Evaluation Program** (May 1988). This is the PC version of the feedlot evaluation explained in "An Evaluation System to Rate Feedlot Pollution Potential", April 1982, by ARS at Morris, MN. This evaluation is required by MPCA. This version was distributed in May 1988 to the area engineers.
- **Ohio Programs** (2001 version-can be downloaded from *oh.nrcs.usda.gov*). This package, developed by Clint Liezert, has seven programs: (1) Animal Waste Management, (2) Grassed Waterway Design, (3) Stadia Survey Note Reduction and Plotting, (4) Hydraulic Formula Solutions, (5) Cross Section Area and Volume Quantities, (6) Water and Sediment Control Basin Design, and

(7) Down Loading Electronically Collected Data. Minnesota does not endorse the use of the runoff package nor the animal waste management program.

- **Radermacher's program for Peak Discharge.** NRCS MN RCN program is not to be used.
- **Radermacher's Programs**: The programs for Terrace Design, calculating a composite runoff curve number and Grassed Waterway Design were developed in the early 1980's. The Terrace Design program was revised by Steve Becker, and a program for Graded Terraces was added by Becker and Willis Goll. The RCN program that is part of the NRCS MN programs package should not be used as the land use options do not include those for residue management. The RCN option followed forms MN-ENG-73 and MN-ENG-75. These forms were revised in 1993 but the program has not been updated. The QPEAK program continues to be an alternative to Chapter 2 of the EFH and TR55. RCN computations may be done manually, or with TR55.
- **SITES.** The SITES program was developed by NRCS to route storms through a proposed reservoir site to determine the necessary elevations for the principal spillway, emergency spillway, and top of dam. This program can analyze both TR-60 structures and 378-Ponds. A user friendly input program to create an input file for SITES is available also.
- **TERRACE SPREADSHEET** (Developed by Steve Schemmel, 2000). Latest version 7/9/01. Users Manual dated 7/9/01.
- **TR20** (Version 2.04 with input and data check programs, 1992 draft users manual). This program was developed by NRCS for evaluating the hydrology of a watershed, usually broken into subareas. This program has routing capabilities for channels and reservoirs. The users manual is Technical Release 20 "Project Formulation-Hydrology."
- **TR55, "Urban Hydrology for Small Watersheds"** (June 1986 manual, Version 2.1). This program determines the peak discharges and/or hydrograph for smaller watersheds, approximately 2,000 acres or less. It can also estimate storage requirements. The PC portions for calculating runoff curve number and time of concentration can be used for many conservation practices that require such information. The program is user friendly. The users manual is Technical Release 55. Use of the built-in ponding and swampy areas correction is discouraged in Minnesota.
- **WSP2** (Oct 1993, Version 2.0 of program dated 10/1/93). This program was developed by NRCS to determine the water surface profile in a channel. It identifies points that act as a restriction to the flow. This identifies the flow velocity, width, and inundation in the floodplain. The users manual is NEH Part 630, Chapter 31 (replaced Technical Release 61). This is no longer supported by NRCS; HECRAS is to be used instead**.**
- **WSP2INPT** (Apr 1990). Input program for WSP2.

II. Other computer programs are available, but because of limited use have not been distributed to field engineers. The following programs fall into this category at this time:

- **AGNPS.** Developed by ARS at Morris, MN, this model analyzes non-point source pollution and prioritizes potential water quality problems in rural areas. The event-based model uses geographic cells to represent upland and channel conditions. Within the framework of the cells, runoff characteristics and transport processes of sediment, nutrients, and chemical oxygen demand are simulated for each cell and routed to the outlet. AGNPS stands for Agricultural Nonpoint Source.
- **DAMBRK.** Developed by the National Weather Service, this program evaluates the likely path and discharge for the failure of a dam.
- **GLEAMS and CREAMS.** CREAMS was developed first, and improved by the development of GLEAMS. The model is designed for use in comparing effects of alternative resource management systems on water and land resources. By integrating climatic, geomorphic, agronomic, and soil data with structural, cultural, and management systems, the model computes relative yields of sediment, nutrients, and pesticides at the edge of field-sized units. It can be used to provide predictive information when calibrated with observed data.

- **HEC1.** This program was developed by the Corps of Engineers and is approximately equivalent to the NRCS' TR20 program. A disk for the program and a users manual are in the state office.
- **HEC2.** This program was developed by the Corps of Engineers and is roughly equivalent to NRCS's WSP2 program or HECRAS. A disk and manual are in the state office.
- **MN Geological Survey County Well Index Data Entry**. The Minnesota Geological Survey is the central repository in Minnesota for any information on wells -- productivity, drilling information, quality, aquifers, etc. They appreciate receiving well information and have provided the documentation to us for inserting and updating records.
- **MO Terrace**
- **RESOP.** This reservoir operations program simulates the water budget of a lake or reservoir on a continuous basis. It requires precipitation data, evaporation and seepage estimates, inflow and outflow data, interflow, etc.
- **SWMM** (Storm Water Management Model). This model simulates urban runoff quality and quantity. It can be used for both single event and continuous simulation. EPA developed it.
- **TR66**. This breach routing program simulates the failure of a dam and helps determine the path and extent of the water. This is used for preparing emergency action plans and determining the hazard class of larger structures.

§MN511.05 Design checking and review.

(a) All work shall be checked before it is submitted to the state office for review and approval. If possible, this shall be done by someone other than the designer. The checker should always check the design concepts and assumptions, to verify that they conform to procedures, criteria, and good engineering practice.